RNAV RNP Procedures for Ontario, California

E Operations Workshop

Kevin Elmer

The Boeing Company

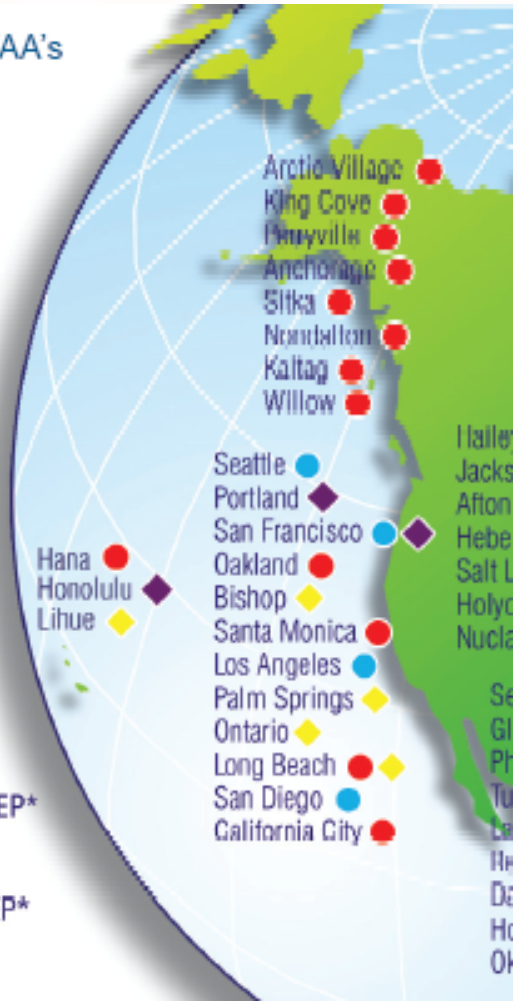
December 6, 2007

Outline

- **FAA's Plan and Schedule**
- **Design Criteria**
- **Operators involvement UPS, Alaska, Southwest**
- **Boeing's Participation**
  - Recommend design options to AVN based on Operator's and TRACON feedback
- **Desired Outcome for ONT RNAV RNP Approach procedures**
  - Reduce Track Distance and Flight Time
  - Accommodate Continuous Descent for Fuel Savings, as well as Noise and Emissions Reduction
  - Usable for all equipped aircraft and SAAAR qualified operator's
  - Pass Environmental Impact Assessment Criteria

FAA's Roadmap for Performance-Based Navigation (Near Term)

The aviation community is using FAA's *Roadmap for Performance-Based Navigation* to leverage advances in flight deck navigation capability to meet the demands of future air travel. As a collaborative (government/industry) effort, the *Roadmap* focuses on accelerating two key elements of PBN at U.S. airports – RNAV and RNP.



Near Term (2006-2010)

Terminal

- ❑**RNAV SIDs/STARs at OEP airports**
- ❑**RNP-1 SIDs/STARs where benefitial**
- ❑**Automation requirements for mergint RNAV arrivals**
- ❑**Concepts for RNAV and RNP with 3D, constant descent arrivals (CDA), and time of arrival control**

AVN Production Schedule

Federal Aviation Administration

Aviation System Standards

- AVN Home
- National Flight Procedures
- Procedure Development
- Quality and Assurance
- FPO Branch
- IFP Production Plan
- IFP Inventory Summary
- Survey Information
- How to get an IFP
- IFP Coordination
- NAV Database Review

AVN Home | Search | Safety | Services | About Us | Contact Us | Site Map | FAQ's | Links

Flight Procedures | Aeronautical Charting | Flight Inspection | Maintenance Operations

Instrument Flight Procedures (IFP) Production Plan

Sorted By: Region, State, Airport ID, Scheduled Publication Date
Data as of 12-04-2007 02:00 AM CDT
Region: All State: All Airport ID: kont
6 items found, displaying all items

State	Airport ID	City/Name	Description	Scheduled Pub Date	Status	Actual Pub Date
CA	KONT	Ontario/Ontario Intl	RNAV (GPS) Y RWY 26 L, AMDT ...	07/31/2008	Under Development	
CA	KONT	Ontario/Ontario Intl	RNAV (GPS) Y RWY 26 R, AMDT ...	07/31/2008	Under Development	
CA	KONT	Ontario/Ontario Intl	RNAV (RNP) Z RWY 8L, ORIG	07/31/2008	Under Development	
CA	KONT	Ontario/Ontario Intl	RNAV (RNP) Z RWY 26R, ORIG	07/31/2008	Under Development	
CA	KONT	Ontario/Ontario Intl	RNAV (RNP) Z RWY 26L, ORIG	07/31/2008	Under Development	
CA	KONT	Ontario/Ontario Intl	RNAV (GPS) Y RWY 8 L, AMDT 1	07/31/2008	Under Development	

Export options: CSV Excel

* Next to Status Identifies an IFP Contingent upon Survey
F Next to Status Identifies a Delay Due to Funding
W Next to Status Identifies a Delay Due to WAAS outage

Comments or Suggestions

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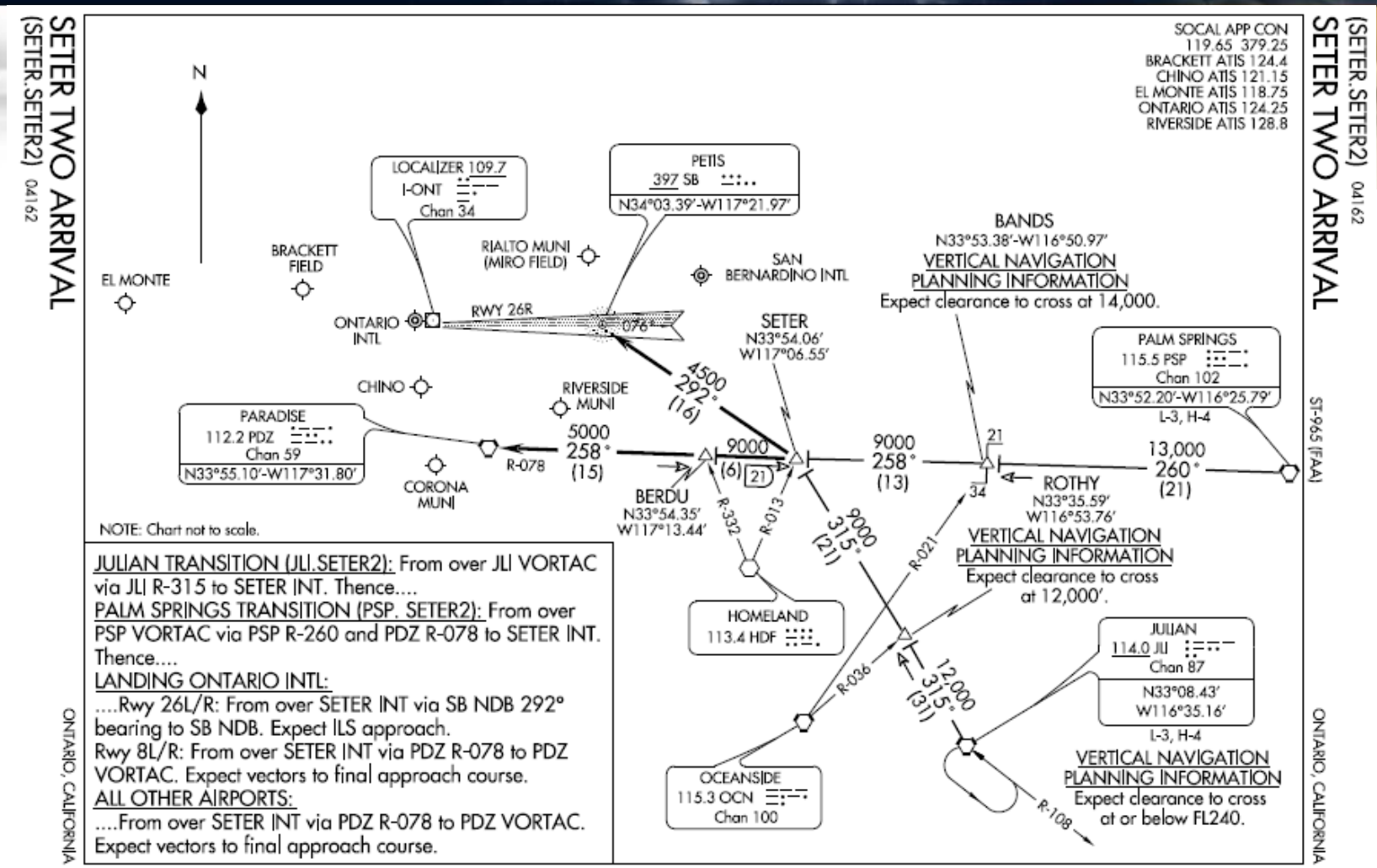
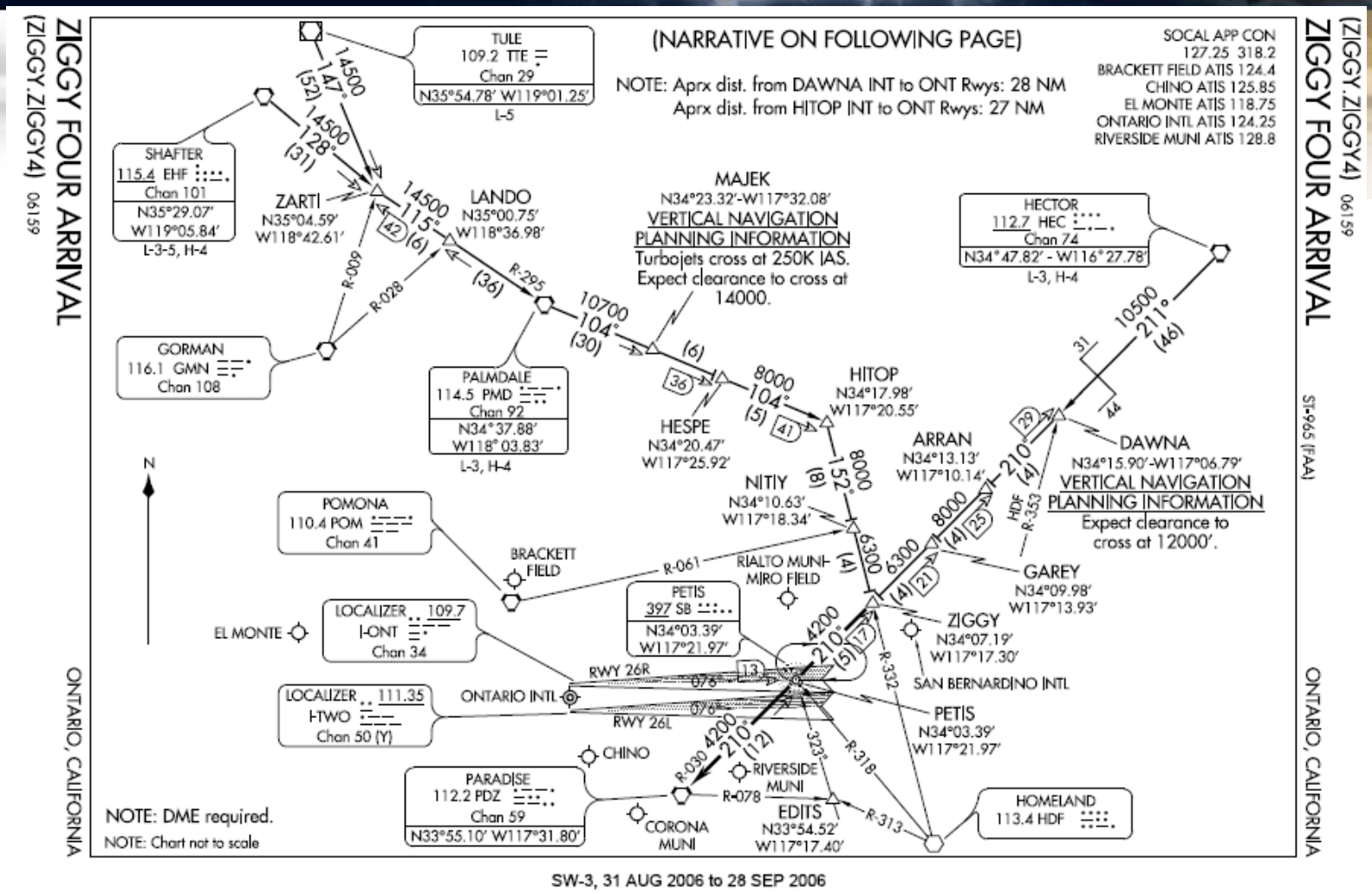
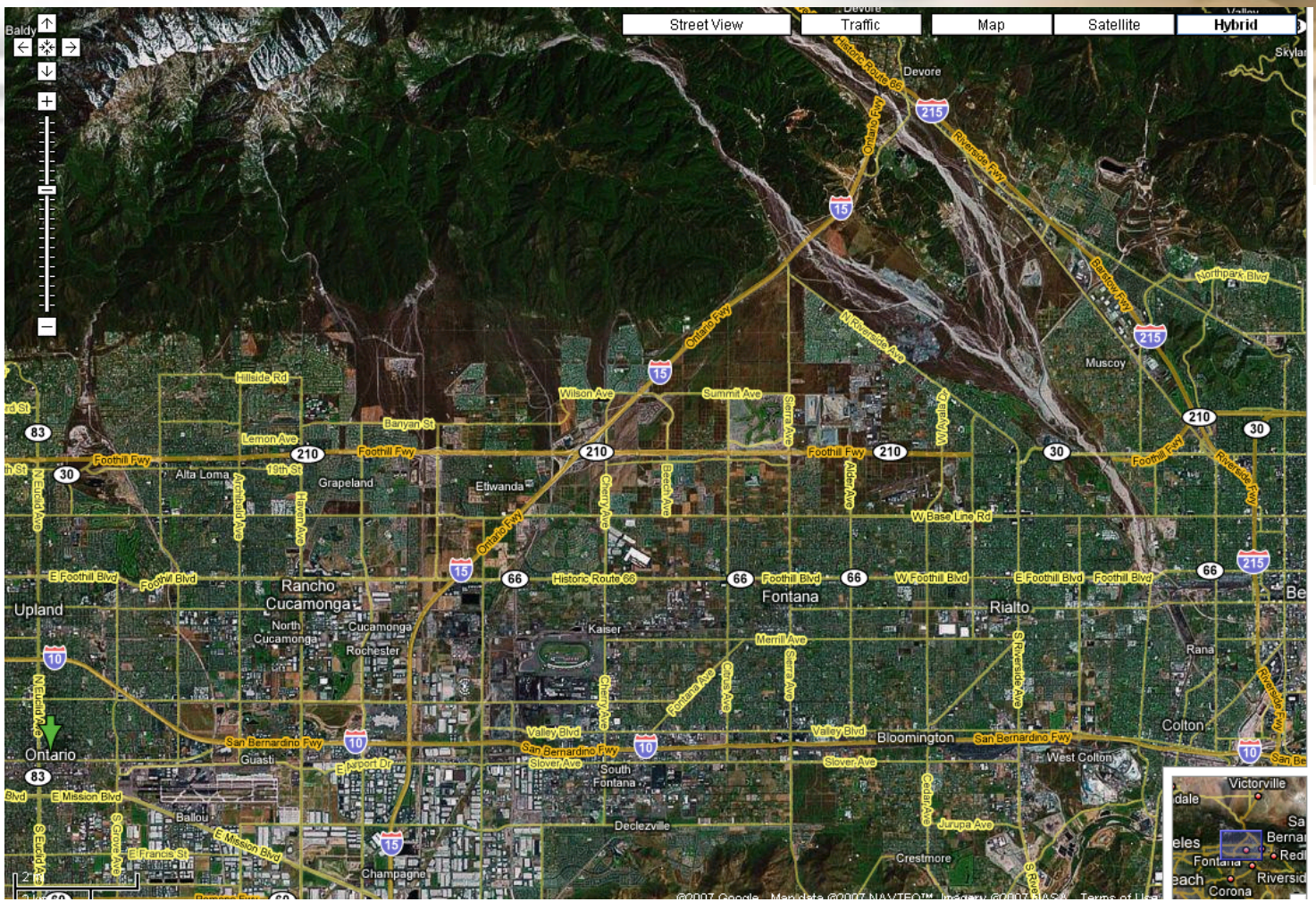
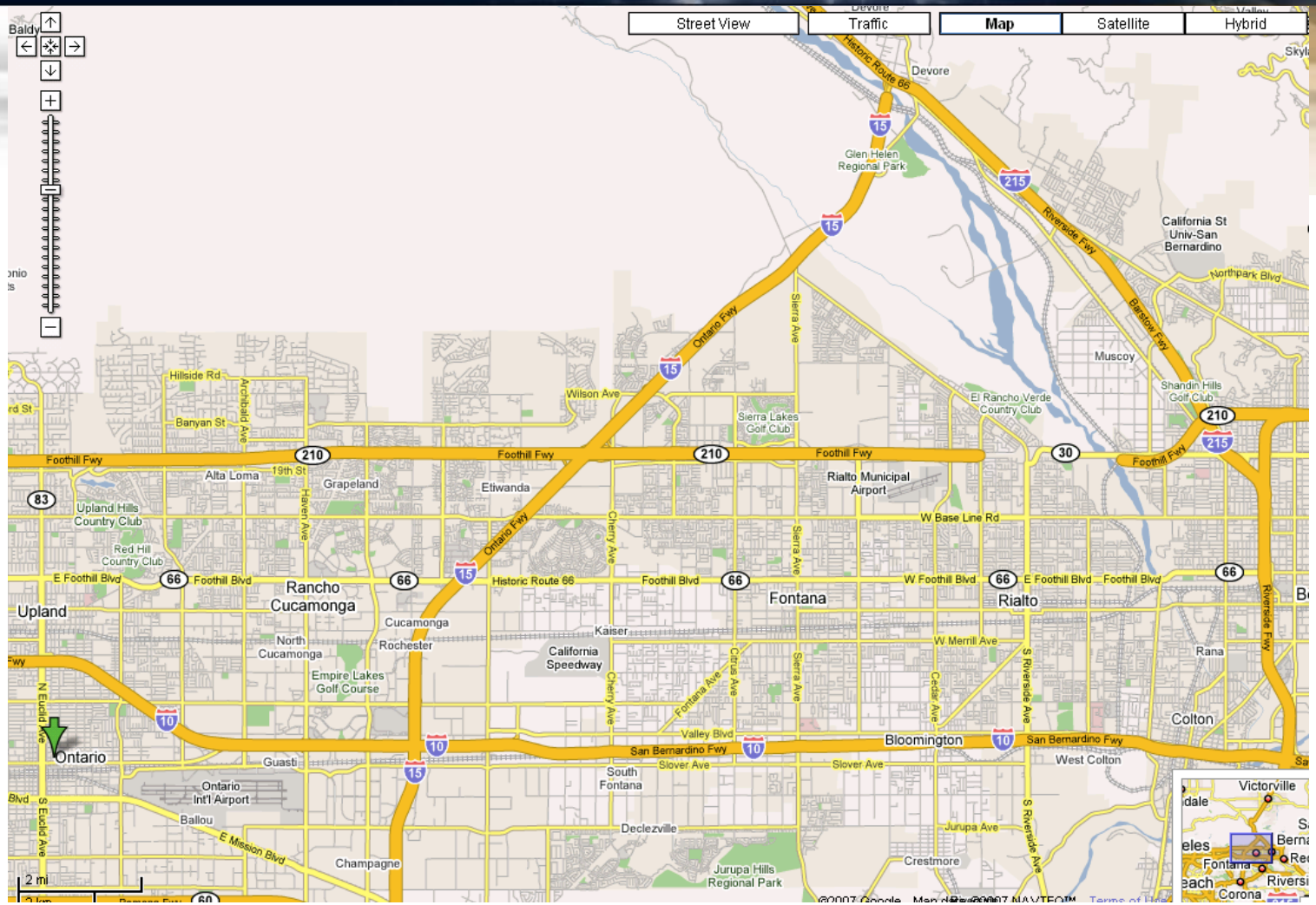
Existing STAR (SETER)



Existing STAR (ZIGGY)



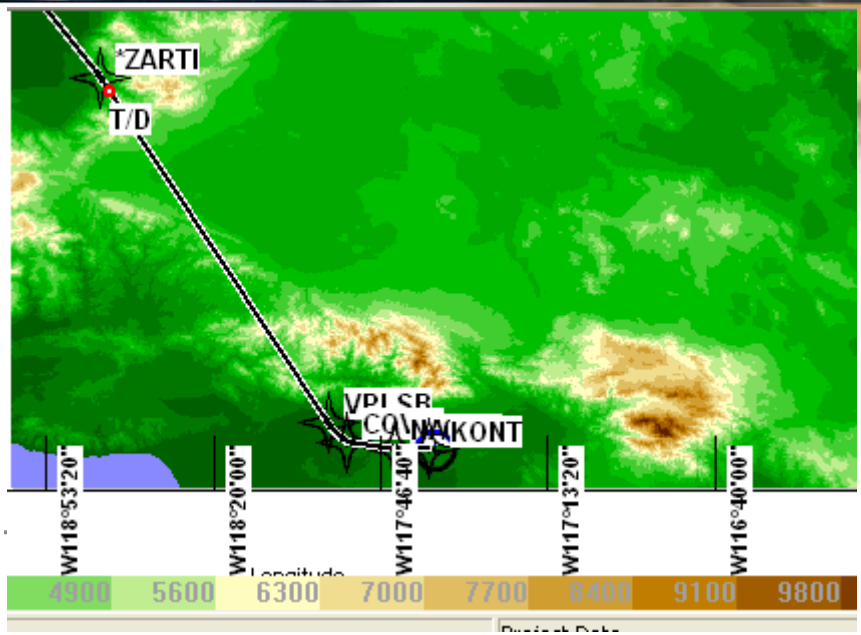


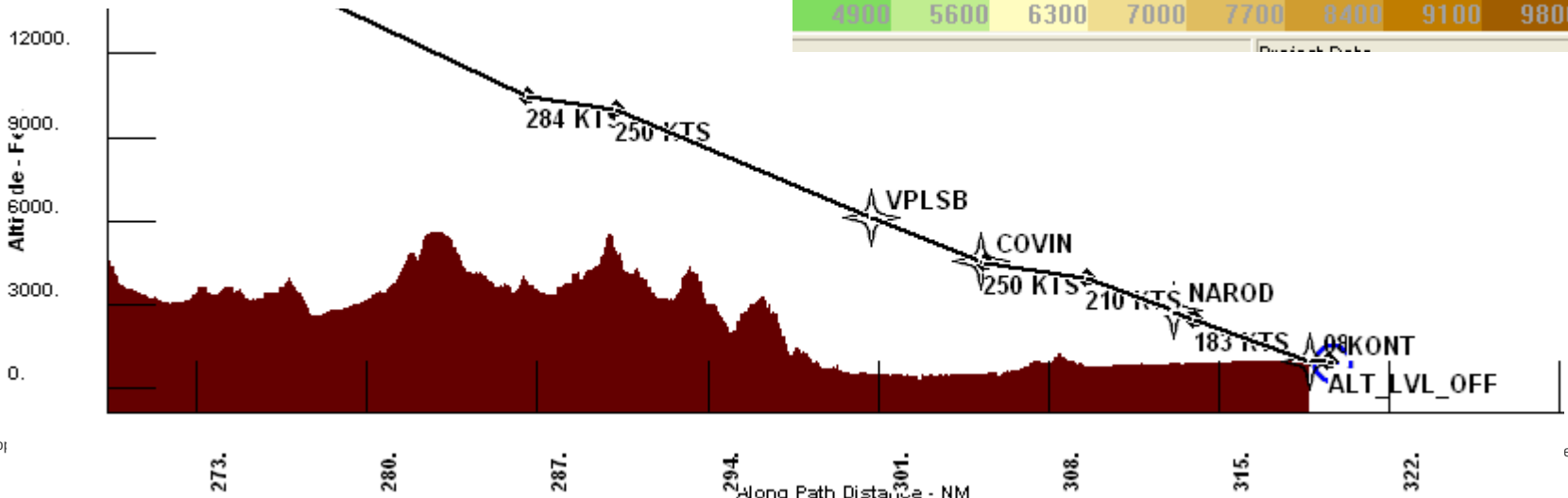


Initial Recommendation (Smiths PDT Tool)
EHF.ZARTI.VPLSB.COVIN.NAROD

? Terrain & Flyability issues (85.9 NM from ZARTI)

ACT RTE LEGS		Fuel Used	Elapsed Time
KOAK	210/ 9	0#	0 min
115°	202 NM		
EHF	.743/FL320	3583#	31 min
128°	31 NM		
*ZARTI	.743/FL320	3932#	35 min
132°	68 NM		
VPLSB	250/ 6164	4199#	47 min
120°	4.4 NM		
COVIN	250/ 4550	4225#	48 min
85°	7.9 NM		
NAROD	189/ **2800A**	4272#	50 min
76°	5.6 NM		
08L	**150/ 988**	4306#	52 min
76°	.9 NM		
KONT	----/ **944**	4350#	53 min

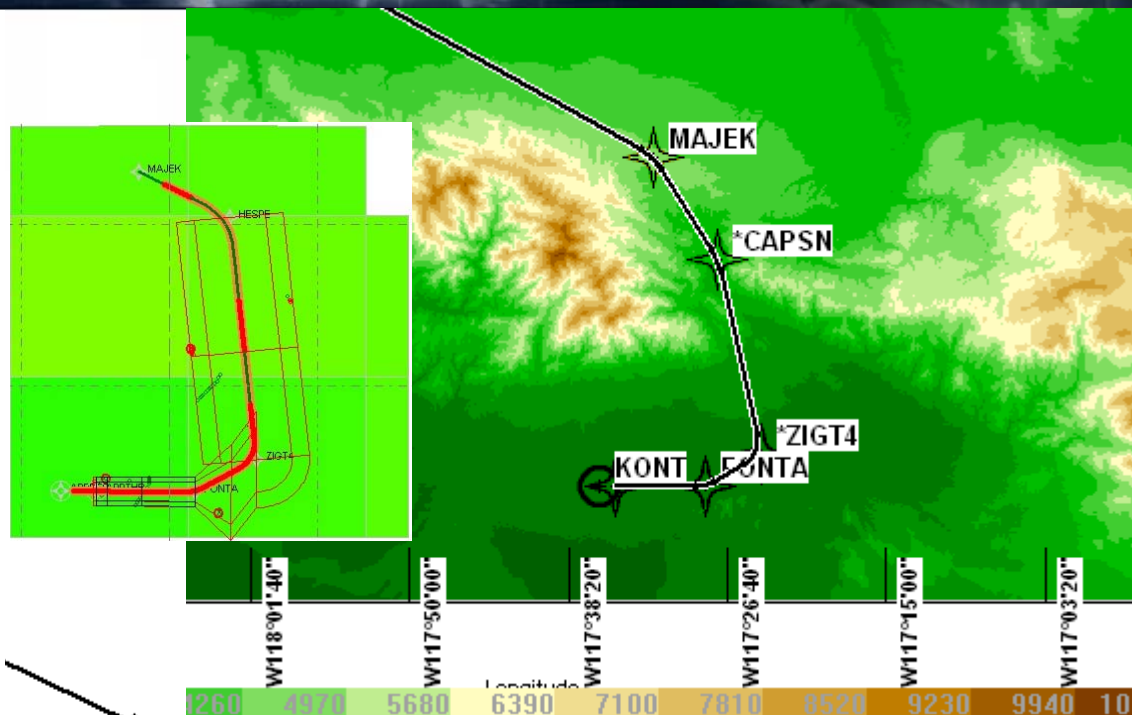


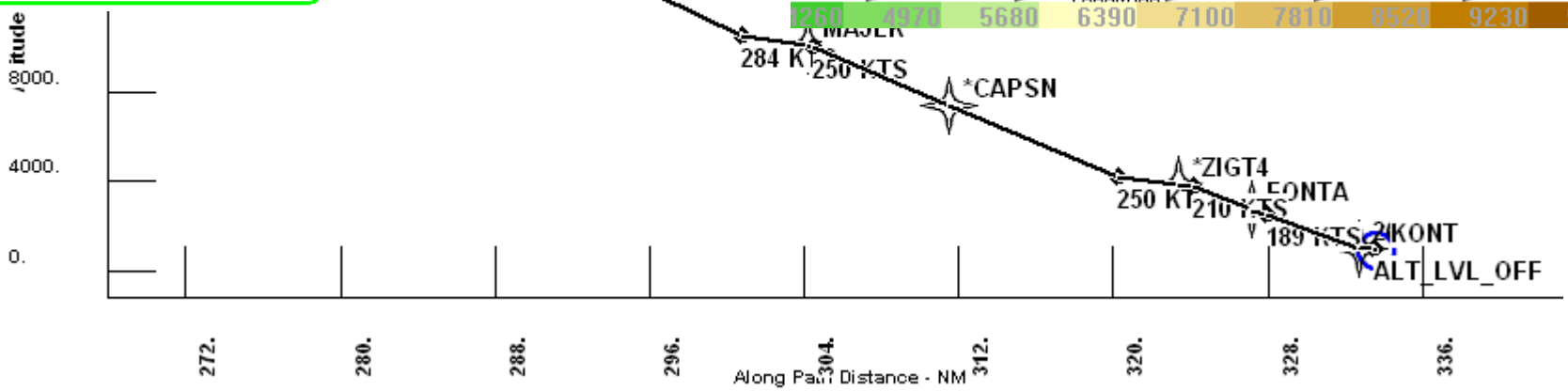


Initial Recommendation (Smiths PDT Tool)

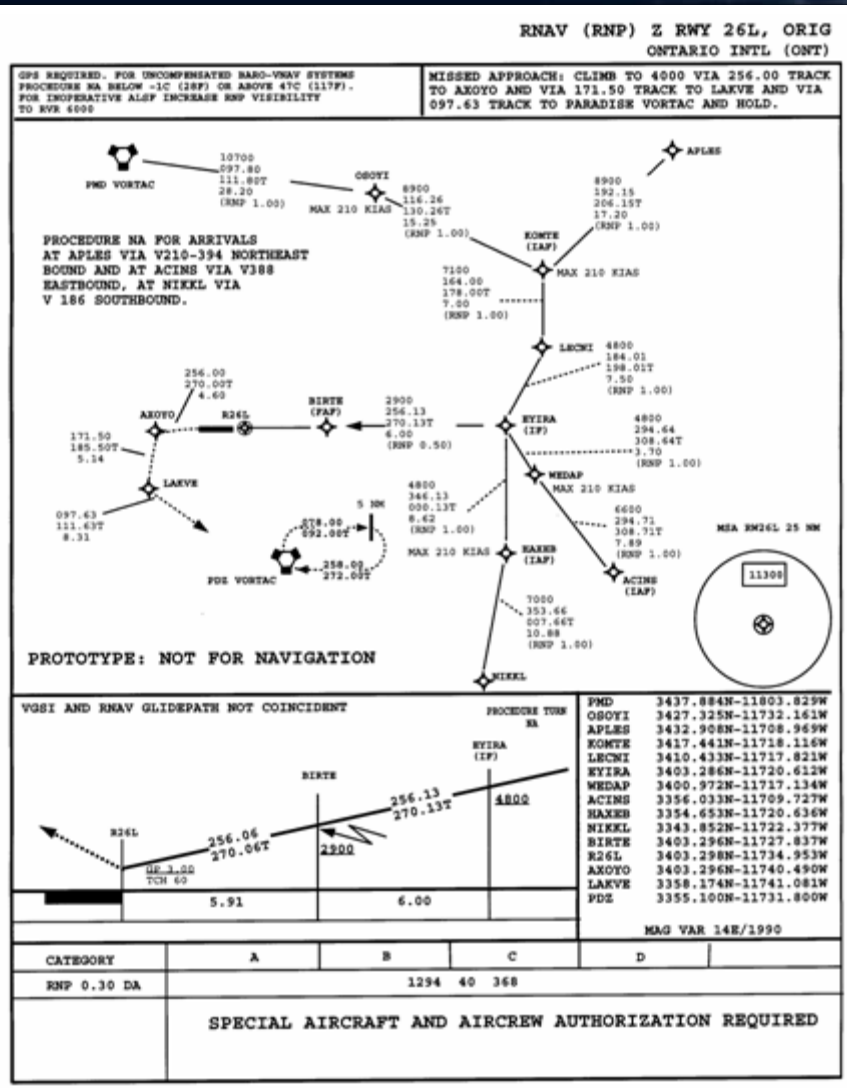
Still Terrain & Flyability issues - (28.6 NM from MAJEK)

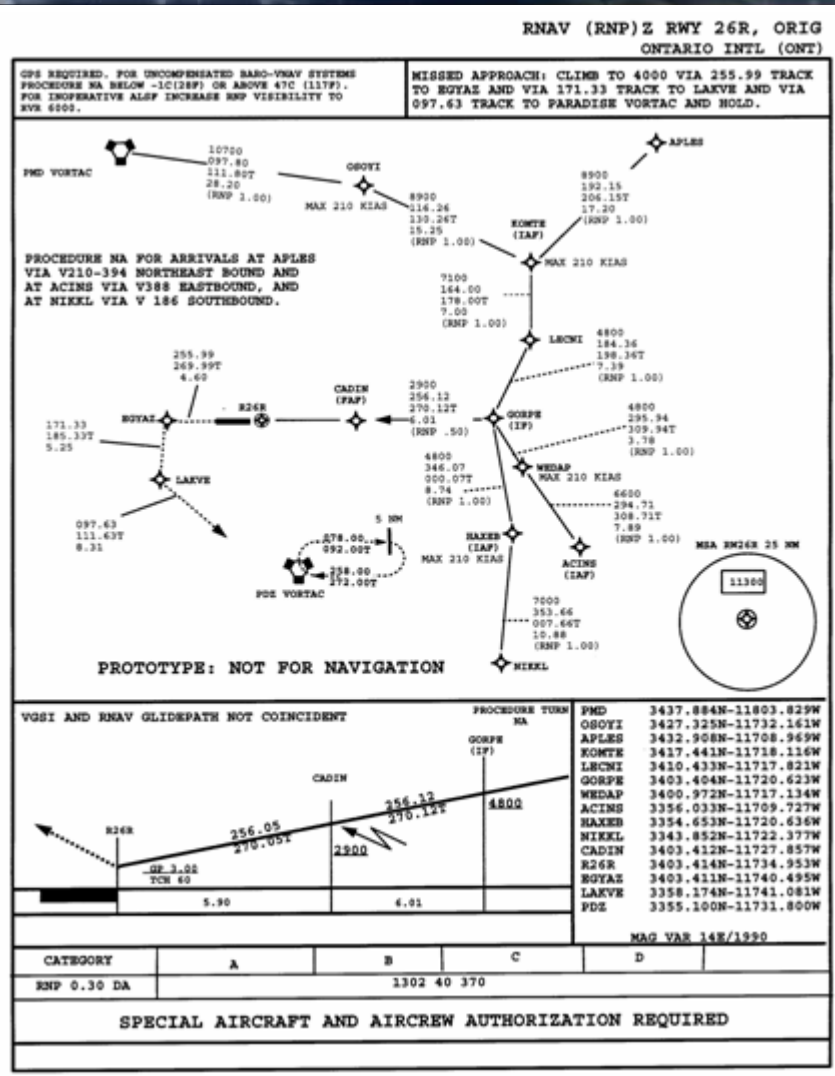
ACT RTE LEGS		Fuel Used	Elapsed Time
KOAK	210/ **9**	0#	0 min
115°	202 NM		
EHF	.743/FL320	3583#	31 min
128°	31 NM		
*ZARTI	.743/FL320	3932#	35 min
116°	6.0 NM		
LANDO	.743/FL320	3998#	36 min
116°	36 NM		
PMD	284/FL213	4170#	42 min
104°	30 NM		
MAJEK	253/10028	4288#	47 min
134°	7.3 NM		
*CAPSN	250/ 7409	4326#	48 min
153°	12 NM		
*ZIGT4	217/ 3854	4396#	51 min
227°	3.8 NM		
FONTA	193/ **2782A**	4416#	52 min
257°	5.5 NM		
26R	160/ **990**	4445#	54 min
257°	.9 NM		
KONT	----/ **944**	4457#	54 min



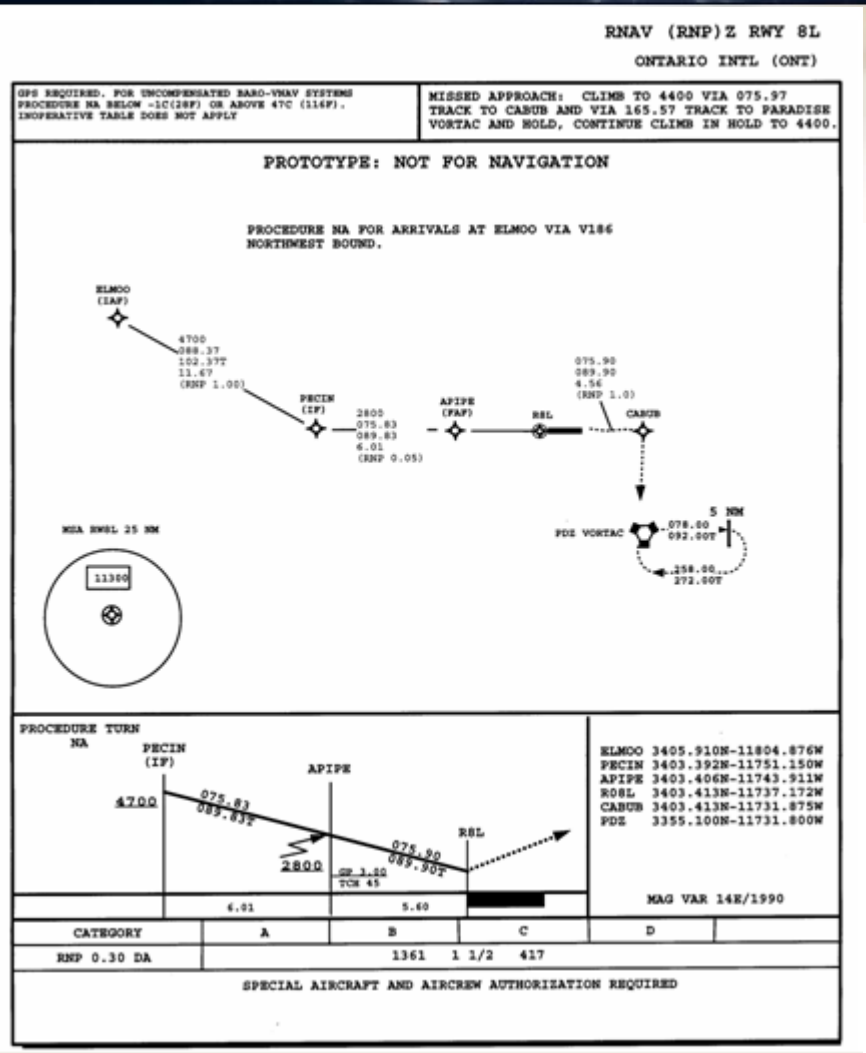


Prototype RNAV RNP Procedures based on TF Legs / Criteria





Prototype RNAV RNP Procedures, cont. based on TF Legs / Criteria



Feedback on Prototype with TF Legs
RNAV (RNP) Z RWY 26R/L

1. Routing. The primary interest in replacing the current ZIGGY FOUR Arrival is to reduce the groundtrack from feeder fixes to the runways.
UPS flies a lot of arrivals from the Northwest--PMD - MAJEK - HESPE - HITOP - NITIY - ZIGGY - PETIS. It looks like your RNAV (RNP) Z RWY 26R/L Approaches both approximate the ZIGGY FOUR waypoints from PMD to PETIS. There is virtually no reduction in the groundtrack distance from the ZIGGY arrival--so there is very little benefit in using this approach over the current arrival/ILS approach.

2. Altitudes. Another desired feature of the new arrival is the desire to fly a Continuous Descent Arrival (CDA) while on the published arrival--traffic permitting. A 10,700 ft restriction at OSOYI is alright, given the extended groundtrack on the approach, but a restriction of 8,900 ft at KOMTE is actually higher than the present 8,000 ft restriction at HITOP, KOMTE's counterpart on the ZIGGY. Our crews must use speed brakes for every arrival over HITOP today and many times they must lower the airplane's landing gear as well in order to intercept the glideslope at PETIS. Being 900 feet higher on the arrival at this crucial point will not make this a useful approach.

I don't understand the TCH of 60 feet. There doesn't appear to be any reason why the TCH cannot match that of the ILS approach--50 feet (the TCH for your RWY 8 approach is 45 ft). I would think that one goal of the approach design is to mimic the features found in an ILS approach.
It would be normal to use the Precision Approach Path Indicators (PAPIs) that are installed for each of the runways, instead of telling pilots not to use them on this approach (VGSI AND RNAV GLIDEPATH NOT COINCIDENT).

3. Airspeeds. The current airspeed restriction is 250 kts at MAJEK.
Your proposal has the speed restricted to 210 kts at OSOYI, MAJEK's counterpart--which is 41 track miles from the runways. Once again, the proposed RNP approaches have the disadvantage of taking more that one minute longer to fly than the current arrival/approach.

4. Missed Approach. The current missed approach procedure (MAP) is to climb straight ahead to 1,700 ft, then turn left direct to PDZ. Your approaches have two waypoints prior to PDZ, making the MAP more complicated than the current one. Your RNAV (RNP) Z RWY 8L has a single waypoint on the departure, then a turn direct to the PDZ VORTAC.

Feedback on Prototype with TF Legs
RNAV (RNP) Z RWY 8L

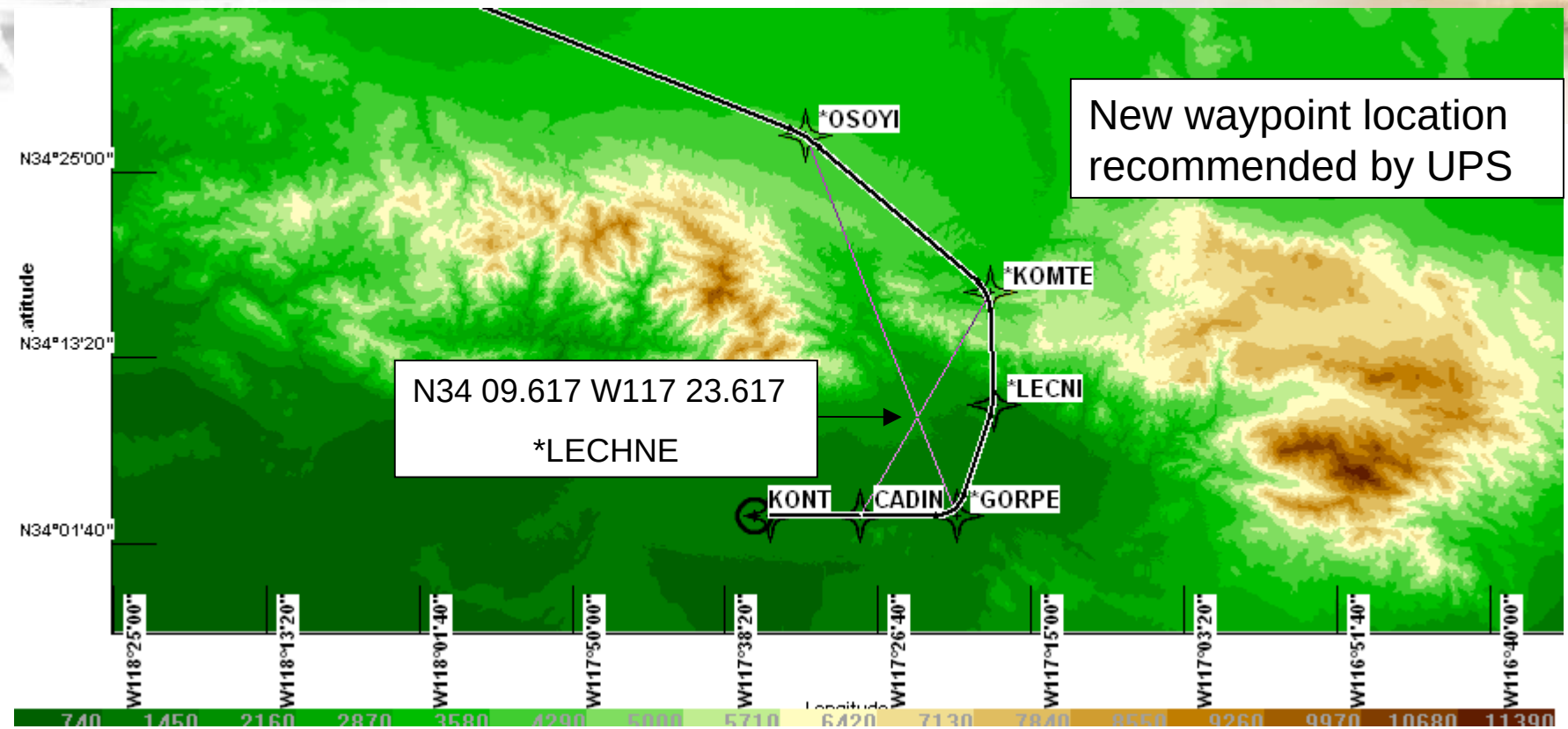
Overall, this approach looks fine. I think that there should be a "T" after the 089.83 value between PECIN and APIPE on the plan view. Also, the RNP value in the same location should be RNP 0.50, not 0.05. On the missed approach, there should be a "T" after the 89.90 value.

RECOMMENDATION

Please take a look at what Boeing's Kevin Elmer has proposed for the approach from the PMD fix. RNP approaches have the benefit of using natural mountain passes that are too narrow to benefit conventional arrivals/approaches due to their TERPS criteria restrictions. Cajon Pass is one such spot and it is currently home to a major freeway, I-15 and numerous railroad tracks (important for environmental considerations). There is no reason that every instrument approach to runways 26R/L must go through a point located 12 NM to the east of the airport. We don't need to replicate what we currently have in place today.

Try drawing a line from OSOYI to GORPE and then another line from KOMTE to CADIN. At the intersection of these lines, create a new waypoint.
Traffic from PMD would go to OSOYI, then this new waypoint, then to CADIN. Traffic from APLES would go to KOMTE, then virtually straight ahead to the new waypoint, then CADIN. This routing would be more beneficial to all inbound traffic as it substantially reduces the track miles flown on the approaches from the north.

Recommendation for RF Leg Based Design

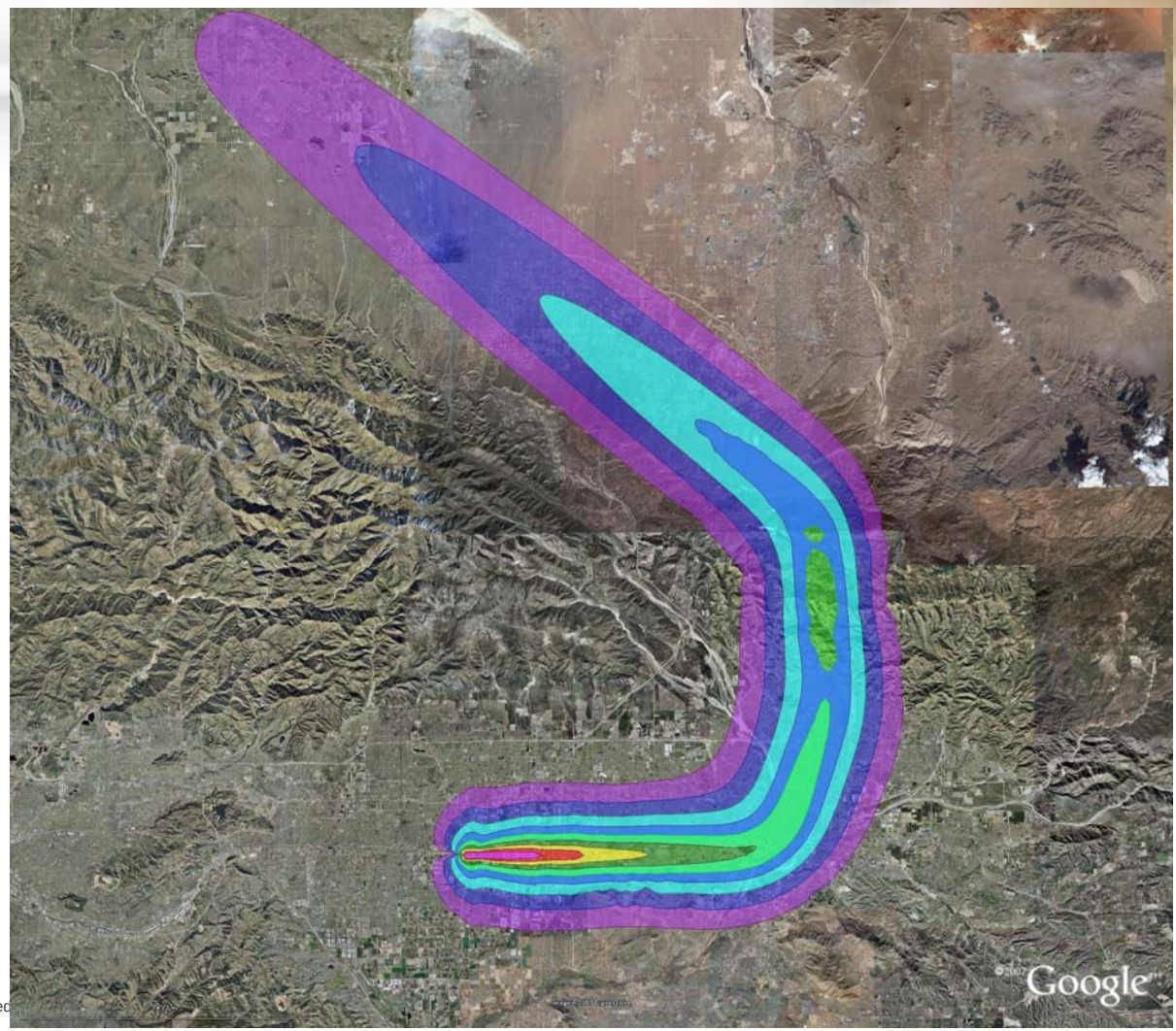


New waypoint location recommended by UPS

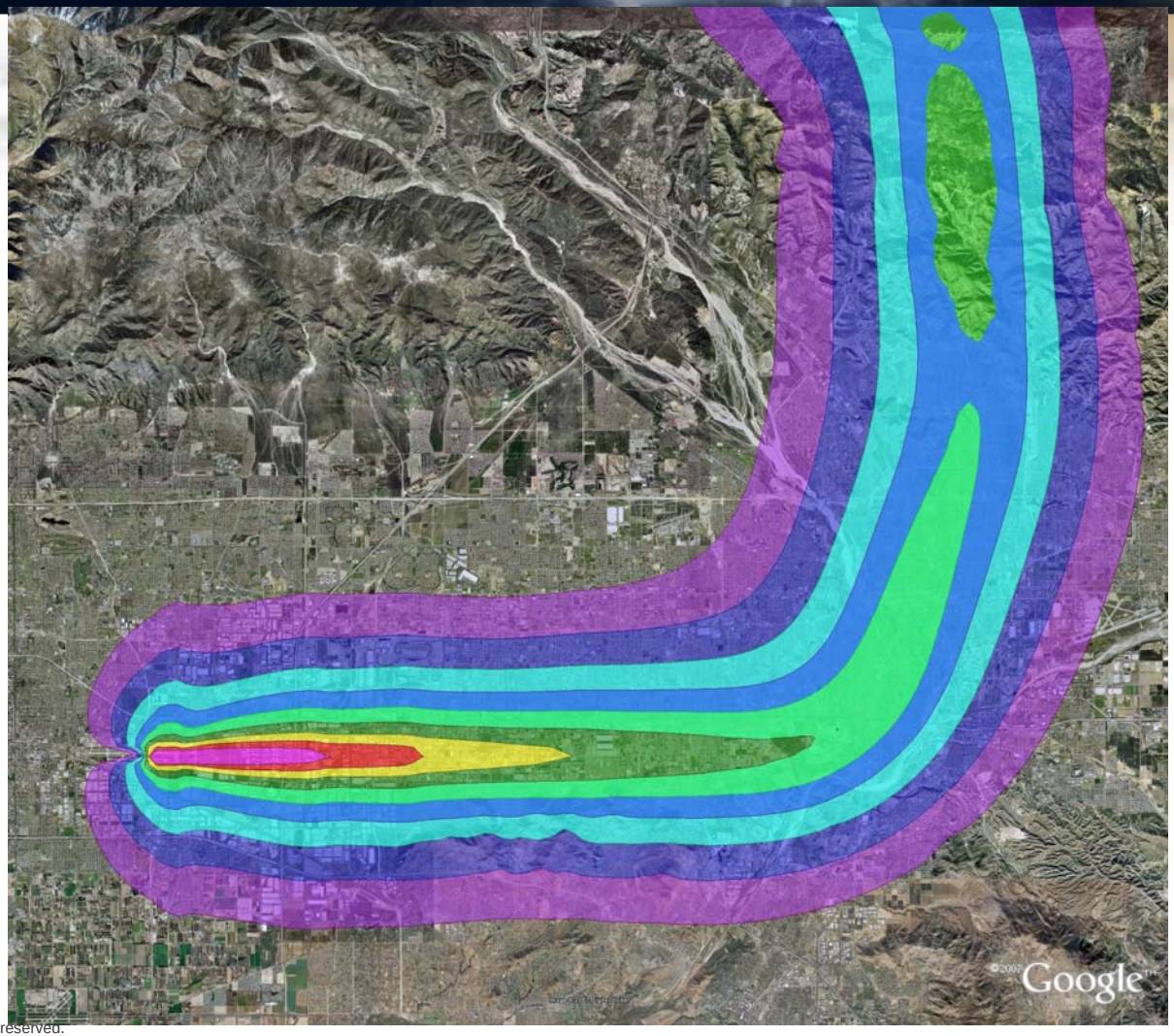
N34 09.617 W117 23.617

*LECHNE

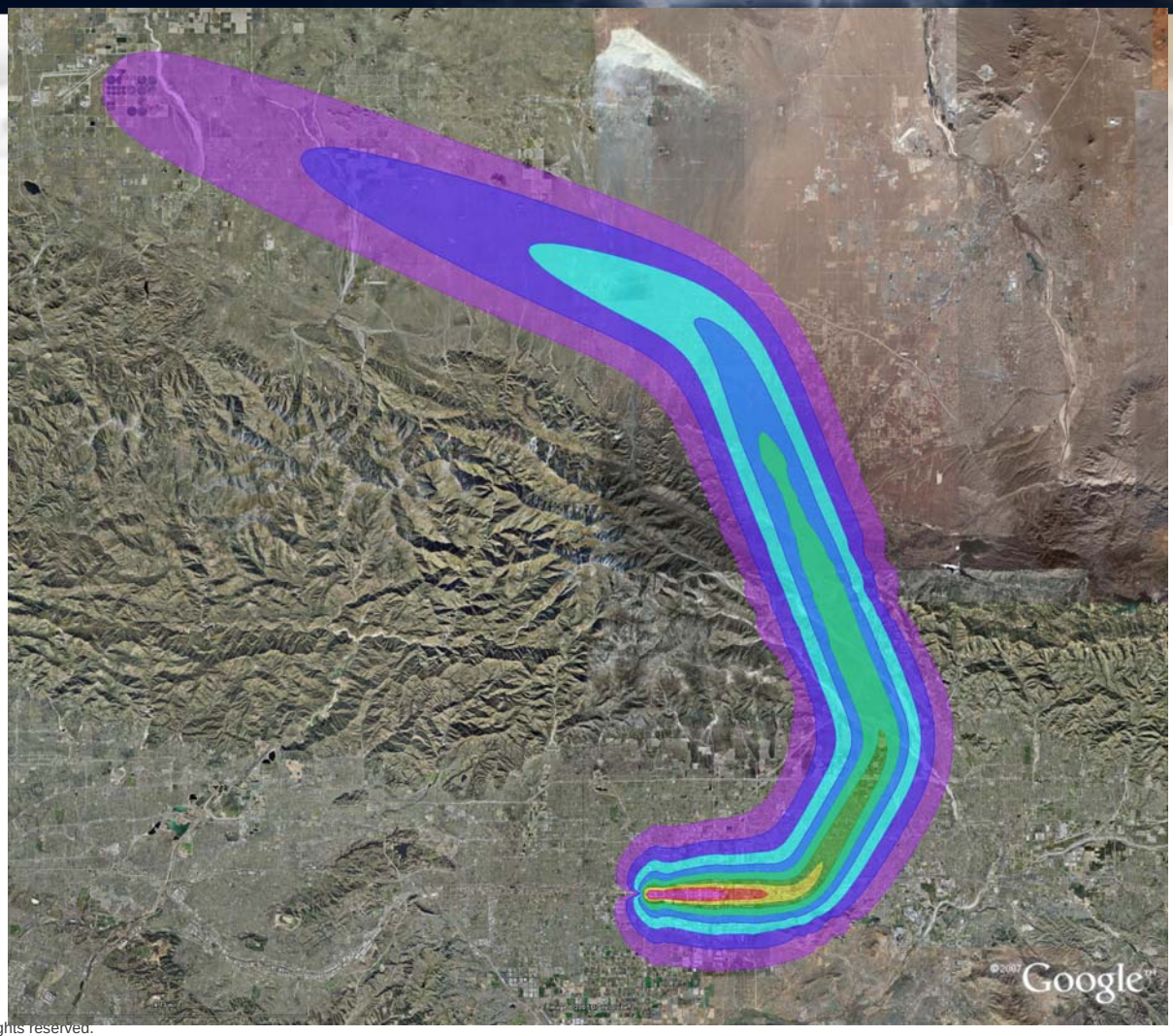
RNAV (RNP) with TF Legs



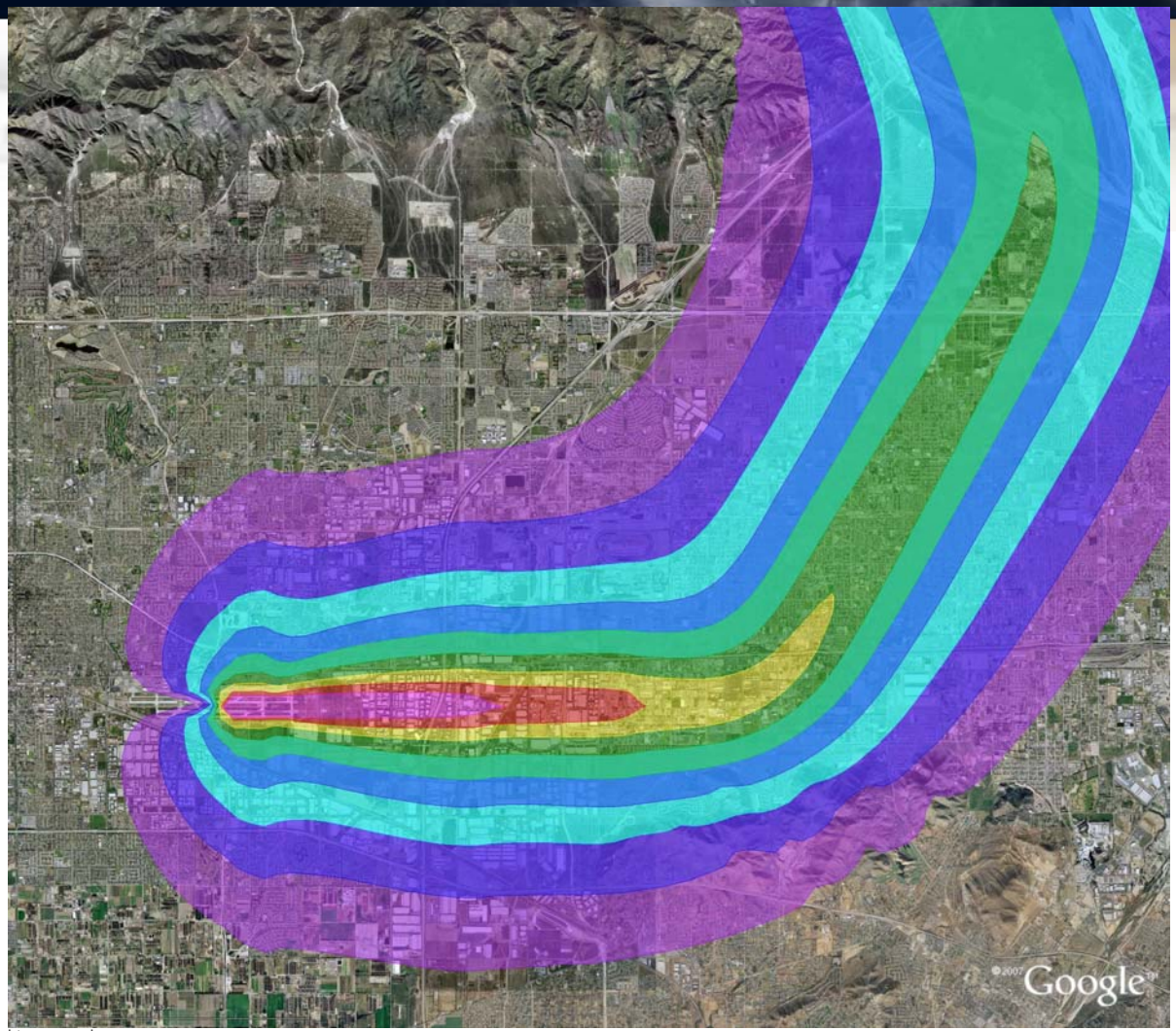
RNAV (RNP) with TF Legs, Cont.



RNAV (RNP) with RF Legs



RNAV (RNP) with RF Legs, Cont.



Noise Technical Report
ONTARIO INTERNATIONAL AIRPORT

The purpose of this document is to provide a discussion of the existing and future noise conditions related to the Pacific Gateway Cargo Center (PGCC) at Ontario International Airport (ONT).

Included in this discussion is a general discussion describing noise, including definitions of the noise metrics used, and the effects of noise on people.

This document also provides details of the inputs used and developed to produce current and future noise impacts at ONT.

This includes aircraft flight and ground operations, flight and taxi paths and profiles, roadway traffic, ground service equipment, stationary sources and construction equipment inputs.

As part of the noise analysis discussed in this document, noise impacts are provided as acres of land use and household and population counts.

Number of Flights Included in Analysis

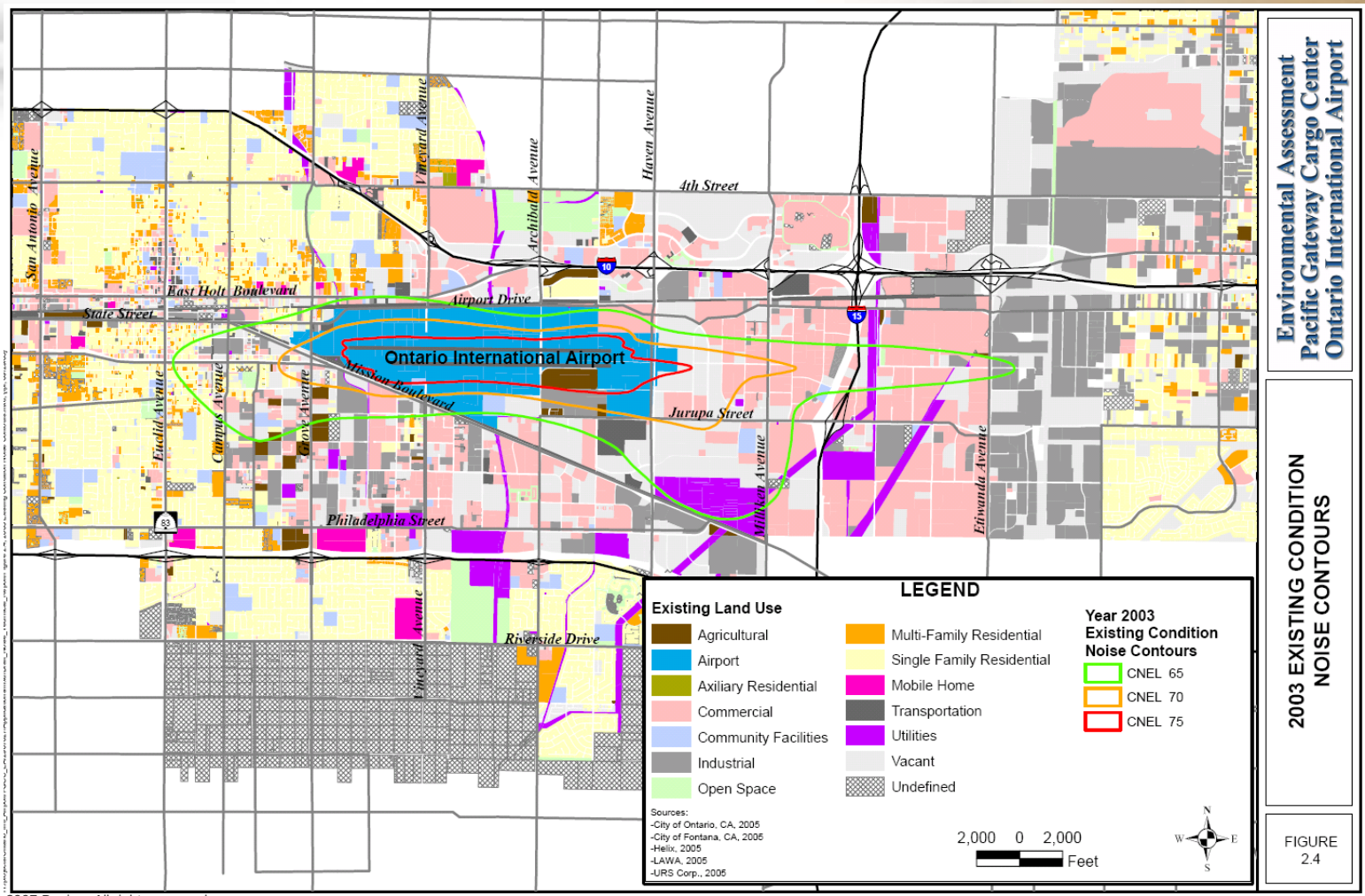
Table 3.3-1
Forecast of Annual Aviation Operations
Ontario International Airport
Pacific Gateway Cargo Center

Aircraft Family	Aircraft Category	No-Action Alternative	Proposed Action Alternative
Air Carrier / Air Taxi / Cargo	Wide-Body Jet	33,258	45,025
	Narrow-Body Jet	200,096	200,982
	Regional Jet	59,488	59,667
	Commercial Turboprop	37,584	46,282
General Aviation	Single-Engine Piston	3,136	3,136
	Twin-Engine Piston	3,033	3,033
	Turboprop	3,992	3,992
	Jet	35,756	35,756
Military	Turboprop	126	126
	Jet	84	84
Total		376,553	398,083

Source: Ontario International Airport, Forecast of Aviation Demand, Keiser Phillips Associates, June, 2005.
URS, 2005.

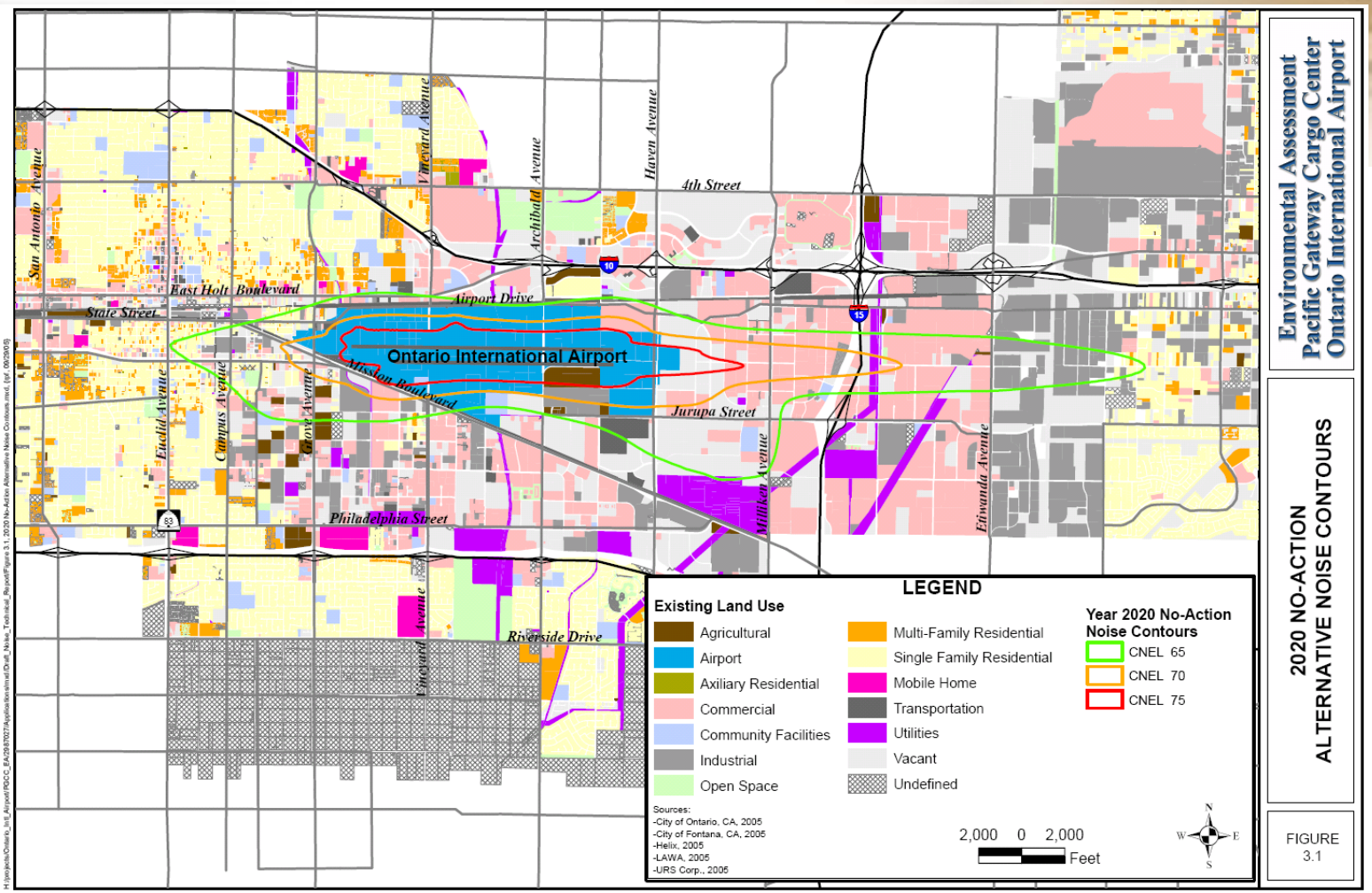
2003 Existing Noise Assessment

Noise Technical Report
Pacific Gateway Cargo Center
March 2006



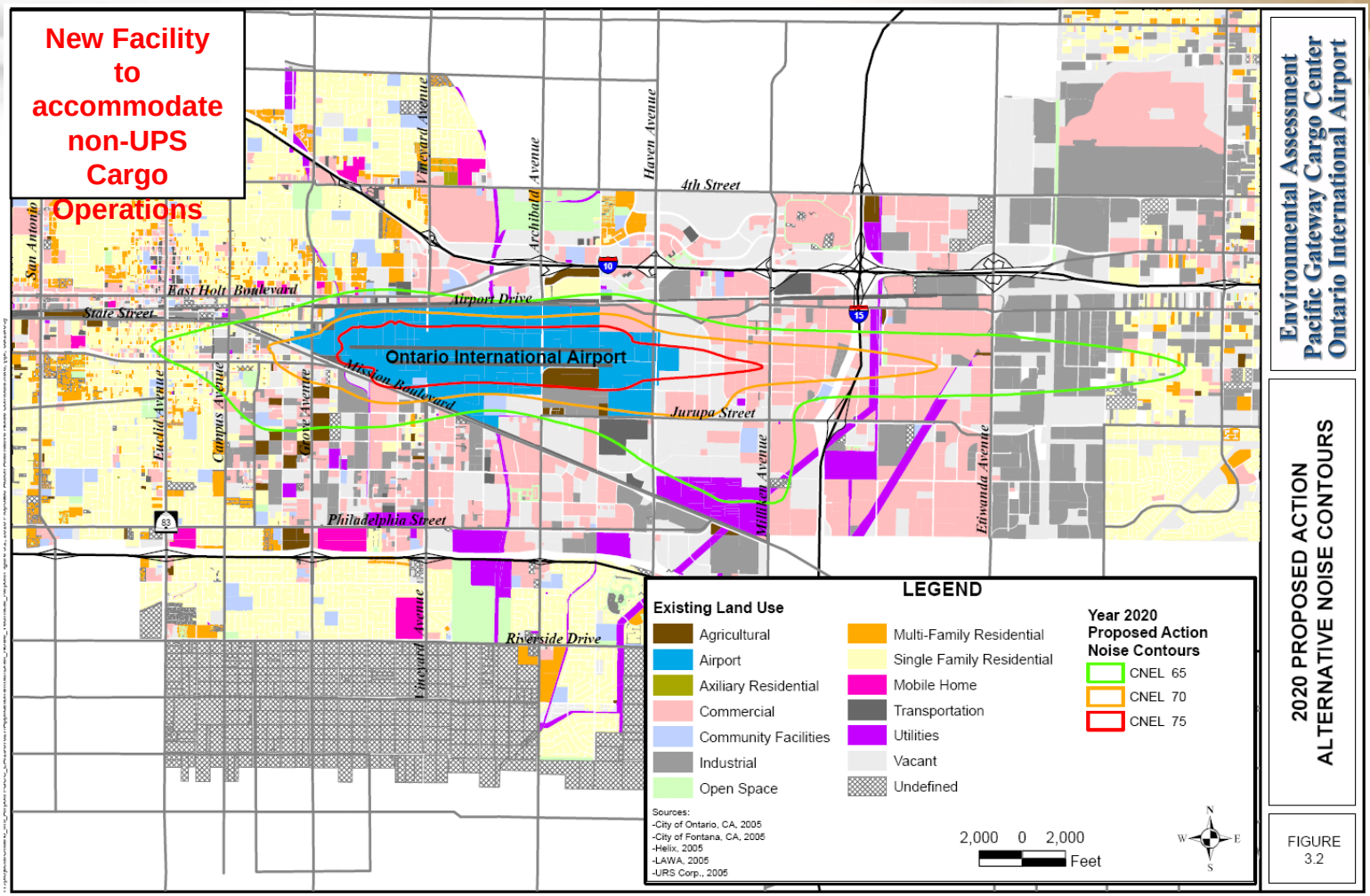
2020 No Action Alternative

Noise Technical Report
Pacific Gateway Cargo Center
March 2006



2020 Proposed Action Alternative

Noise Technical Report
Pacific Gateway Cargo Center
March 2006



Summary

- **Ongoing Collaborative Effort to Provide Guidance for RNAV RNP Design at ONT**
  - Initial Recommendations tested in Simulator
- **TF Legs Inadequate for Beneficial Design**
- **Agreement to on Procedure Development Objectives**
- **Design Work Rescheduled**